International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 03, March-2022

A Review Paper on Use of Recycled Aggregates in Concrete

Neeraj Kumar and Rajbahadur
Assistant Professor,
Department of Civil Engineering, IFTM University
Moradabad,U.P., India

***Abstract*— In this paper a study has been made on the past researches carried out by the different scholars and their results have been studied. Today construction industry faces shortage of aggregate. Construction industry produces 40% of total waste each year. This causes the severe environmental hazards and causes land fill issue. The possible solution is to reuse recycled concrete aggregate in place of natural aggregate, which reduces landfill disposal, conserving the primary resources and reducing the transportation cost and promote the sustainable development. The application of recycled aggregate to use in construction activities have been practice by developed European countries and also of some Asian countries. We know that concrete is the main construction material across the world and the mostly used in all types of civil engineering works. As aggregate represents about 70-80% of concrete components, so it will be beneficial to recycle the aggregate for construction works and also to solve the environmental problems.**

Keywords: Recycled aggregate concrete (RAC), Performance of recycled aggregate concrete, compressive strength.

1. INTRODUCTION

The need and importance of concrete in construction industry is ever increasing. Recycled Aggregate Concrete (RAC) is concrete that using Recycled Aggregate (RA) as partially or fully replacement in coarse and fine aggregate. It is believed RA have been used from 1945 in concrete producing and started when World War II damaged a large quantity of concrete structures and the high demand of aggregate to rebuild the structures. Often the sources of material from which a recycled aggregate came (and there could be more than one source), are unknown and the variability and strength of the recycled aggregate concrete could be adversely affected in comparison with a recycled aggregate concrete where the recycled aggregate came from one source with a known history of use and known strength. It is therefore necessary to distinguish between the properties of recycled aggregate concrete made using demolition concrete aggregate and that using leftover concrete aggregate.

Concrete is a construction material & It is preferred for its better performance, longer life and low maintenance cost. These demolished materials (majority of which is usually concrete) are often dumped on land and is not reused for any purpose. Concrete is the most widely used construction material on this earth. In fact, concrete is used in virtually everything and there is still no substitute available for many of its applications. Without concrete, the community and society cannot exist. Therefore, lots of researches are going to find the new varieties of concrete which are economical for the construction. All these researches are focused on the replacements of different ingredients of the concrete which makes the concrete cheaper and even stronger too.

Demolished Concrete Blocks Recycled Coarse Aggregate (RCA)

2. LITERATURE SURVEY

Parekh D. N. et al (2011) studied the basic proper-ties of recycled fine aggregate and recycled coarse aggregate. He also compares these properties with natural aggregates and resulted that recycled aggregate concrete has better resistance to carbonation than natural aggregate concrete.

G. Murali et al, (March 2012) "Experimental investigation on concrete with partial replacement of coarse aggregate" The study on effects of shahabad (a variety of cudappah) stone and the chemical admixture (supaflo) on concrete were investigated. Natural aggregate had been replaced with the waste shahabad stone in four different percentages namely 10, 20, 30 & 40 %. A comparison was made between the specimens of partially replaced coarse aggregate and the same set of specimens admixed with supaflo. The effects on compressive strength, split tensile strength and modulus of rupture were reported. Test results indicated that the replacement of coarse aggregate by 30% had attained a good strength.

Katrina Mc Nei et al (2013) studied about the properties of the RCA, the effects of RCA use on concrete material properties, and the large scale impact of RCA on structural members and found that aggregate properties are most affected by the residual adhered mortar on RCA due to less density and more porosity of the RCA. They also investigatedthat the RCA particles are more round in

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 03, March-2022

shape and have more fines broken off in L.A. abrasion and crushing testes.

Shivakumar et al, (June 2014) " Use of building demo-lished waste as coarse aggregate in porous concrete" In this experimental study, the utilization of building demolished waste in the manufacturing of Porous concrete as a replacement of coarse aggregate. By the investigation it is found that the porous concrete results are encouraging to use as a porous material for the drain-ability and has been found to be comparable to the conventional concrete. Porous concrete may be an alternative to the conventional concrete because of low density and high porosity.

Jitendra Kumar Tanaji Mohite et al (2015) studied about the different test on the natural aggregate, recycle aggregate and blended aggregate and compare results and found that the strength of the recycled aggregate concrete is slightly less for the same condition as that of the natural aggregate. The amount of the reduction depends on the parameters such as amount of blending of the recycled aggregate, w/c ratio, quality of the processed recycled aggregates.

R. Siva Kumar et al, (March 2016) "An Experimental study on partial replacement for coarse aggregate by Granite Waste". This project is experimented to reduce the cost of concrete. The only way to reduce and tackle these problems is reuse and recycles. In this work, experiments have been conducted with the collection of materials required and data required for mix design are obtained. The granite wastes were properly cut down to the size of coarse aggregate and then they were mixed with the concrete in 10%, 20%, 30%, 40%, 50%. Cubes were casted with these concrete mixes and subjected to curing of 7 days, 28 days and their strength is determined. The compressive strength of concrete is same with the conventional concrete only at 10%, 20%, 30% replacement of granite waste. The strength is gradually decreasing at 40% and 50%.

B. Govinda Rajulu et al, (March 2017) "Strength of concrete by replacement of coarse aggregates with waste rubber and demolished waste materials" In this experiment, our present aims to investigate the optimal use of recycled aggregates and waste tire rubber as coarse aggregate in concrete composite and the change in mechanical properties of concrete. It is found that the use of recycled waste tire rubber aggregates results in the formation of light weight, elasticity and energy absorption and heat insulation properties.

Animesh Awasthi et al (2018) studies the effect of adding Recycled Aggregate Concrete Containing Silica Fume as Partial Replacement for Cement and found that the higher water absorption capacity of recycled aggregates has great influence on the water added to the mix, which can affect concrete's workability. They also found that it is possible to gain the same compression and split tensile strength as conventional concrete up to 30% replacement of natural aggregate with recycled ones. But both the compression and split tensile strength values are decreasing with the increase in replacement levels of recycled aggregates. The increase of recycled aggregates content beyond 30% has a negative effect on compressive strength of recycled aggregates concrete. The reduction in compressive strength after 28 days is about 10% when 50% recycled aggregates are used.

Application of Recycled Aggregates:

- It helps to promote sustainable development in the protection of natural and reduces the disposal of demolition waste from old concrete.
- Recycled concrete can be also used in the production of concrete for pavements, shoulders, sidewalks etc.

3. CONCLUSION

Usually, demolished waste is dumped either in the dumping yard or low lying areas. A huge quantity of construction and demolition waste is produced every year. These waste materials need a large place to dump and hence the disposal of waste has become a serious problem. Also, the continuous use of natural resources for producing conventional concrete leads to reduction in their availability of resources and results in the increase of the cost of the coarse aggregate.

From the above study the following conclusions can be drawn-

(i). It is clear that recycled aggregate can be used with natural aggregates.

(ii). Higher ratio of Recycle aggregate can worsen the properties and strength of mix.

(iii). Due to use of recycled aggregate in construction industry it can slow the impact of waste on environment.

(iv). Furthermore improvement is needed in the recycled aggregated cement.

REFERENCES

[1] Parekh D. N. and Dr. Modhera C. D., "Assessment of recycled aggregate concrete", Volume 2, Issue 1, pp. 19, March 2011.

[2] Experimental investigation on concrete with partial replacement of coarse aggregate by G. Murali, K.R. Jayavelu, N. Jeevitha, M. Rubini and N.R. Saranya Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 2, Issue 2, Mar-Apr 2012, pp.322-327.

[3] Katrina Mc Nei, Thomas H.K. Kang, "Recycled concrete aggregate: A Review", Volume 7, No.1, pp.61–69, March 2013

[4] Use of building demolished waste as coarse aggregate in porous concrete by Shivam kumar, M. N, Nithin K.S, B.M Gangadharappa. IJRET: International Journal of Research in Engineering and Technology ISSN: 2319-1163 | ISSN: 2321-7308

[5] Jitendra kumar Tanaji Mohite,sumit kumar, 'Comparative Study of the Effect of use of Recycle Aggregate on Concrete" , Volume 3, Issue 12, December 2015

[6] An Experimental study on partial replacement for coarse aggregate by Granite Waste. R.Siva Kumar, H. Mohammed Yousuff, M. Haripriya IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 3 Issue 3, March 2016. ISSN 2348 – 7968.

[7] Strength of concrete by replacement of coarse aggregates with waste rubber and demolished waste materials by B. Govinda Rajulu , Dr. CH. Kannam Naidu , S. Ramlal International Journal of Mechanical Engineering and Technology (IJMET) Volume 8, Issue 3, March 2017, pp. 304–313

[8] Animesh Awasthi, Gourav Soni, Ram Bharosh, "Study of Recycled Aggregate Concrete Containing Silica Fume as Partial Replacement for Cement", Volume 4, Issue 2, pp. 239-245, 2018 .

[9] M.S Shetty - Concrete Technology, S. Chand and company ltd. Reprint 2008

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 11 Issue 03, March-2022

[10] IS-456-2000 (plain and reinforced concrete requirements)
[11] IS-383-1970 (specification for materials)
IS-10262-2009 (concrete mix design)
Demolished waste as coarse aggregate in concrete by Mohd Monish, Vikas Srivastava, V.C. Agarwal, P.K. Mehta and Rakesh Kumar. J. Acad. Indus. Res. Vol. 1(9) February 2013 540 ©Youth Education and Research Trust (YERT) Mohd. Monish et al., 2013 ISSN: 2278-5213
[12] Use of construction renovation and demolition waste in partial replacement of coarse aggregate in m20 concrete by N. Sai Trinath Kumar, Chava Siva IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308